DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention requires a luminescence side for the flat-surface mold fluorescent lamp made into the rectangle-like flat surface so that it may be suitable for a detail about a fluorescent lamp as an object for the back lights of the liquid crystal display used as a display screen of for example, a portable television receiver.
[0002]
[Description of the Prior Art] It is drawing 4 which shows the configuration of this conventional kind of flat-surface mold fluorescent lamp 90, and when this flat-surface mold fluorescent lamp 90 is used as an object for the back lights of the liquid crystal display described above, for example, the luminescence side glass substrate 91 and another side are formed for either as a reflector glass substrate 92.
[0003] The transparent electrode 93 which gave translucency to the phase confrontation with the reflector glass substrate 92 of said luminescence side glass substrate 91 by considering as transparent conductive members, such as ITO, and the transparence dielectric layer 94 by silicon oxide etc. are formed, and the fluorescent substance layer 95 is further formed by the top face with the dip method etc. as about 15-micrometer thickness. On the other hand, a reflector 96 is formed by the phase confrontation of the reflector glass substrate 92 with the aluminum vacuum evaporationo film etc., and the transparence dielectric layer 94 and the fluorescent substance layer 95 are formed like the above on the field of this reflector 96.
[0004] The closure of the periphery section is carried out by the sealants 97, such as frit glass, discharge room 90a is formed, rare gas, mercury, etc. are enclosed in said discharge room 90a, and the luminescence side glass substrate 91 and the reflector glass substrate 92 which were formed as mentioned above are completed as a flat-surface mold fluorescent lamp 90.
[0005] By having considered as the above-mentioned configuration, when turning on the flat-surface mold fluorescent lamp 90 Luminescence from the fluorescent substance layer 95 by the side of the luminescence side glass substrate 91 becomes what penetrates the transparence dielectric layer 94 and a transparent electrode 93, and is emitted outside. Luminescence from the fluorescent substance layer 95 by the side of the reflector glass substrate 92 gives a part to the fluorescent substance layer 95 by the side of the luminescence side glass substrate 91 directly, a part becomes what reaches the fluorescent substance layer 95 by the side of the luminescence side glass substrate 91 after reflecting with a reflector 96, and, thereby, the synchrotron orbital radiation to the exterior is reinforced.
[0006]
[Problem(s) to be Solved by the Invention] In this kind of flat-surface mold fluorescent lamp 90, the light was switched on with the power source of small capacity, such as a cell, in many cases, and in order to reduce power consumption so and to make the available time extend, improvement in much more luminous efficiency is being demanded. However, with the present configuration, the trouble said that the improvement in the above luminous efficiency is more difficult, and the request of a commercial scene does not respond was produced, and solution of this point had considered as the technical problem.
[0007]
[Means for Solving the Problem] As a concrete means for solving the above mentioned conventional technical problem, this invention It is the flat-surface mold fluorescent lamp which an electrode, a dielectric layer, and a fluorescent substance layer are formed in the field by the side of each relativity of two glass substrates which confront each other, and changes. And one [said] near field sets to the flat-surface mold fluorescent lamp with which a luminescence side and one of other near fields are made into a reflector, one near electrode and near dielectric layer being made into translucency, and one of other electrodes being used as reflexibility. Said fluorescent substance layer by the side of said luminescence side is set to 5-10 micrometers in thickness, and it is offering the flat-surface mold fluorescent lamp characterized by setting thickness to 25-40 micrometers, and said fluorescent substance layer by the side of said reflector enables improvement in much more luminous efficiency, and solves a technical problem.
[0008]
[Example] Below, this invention is explained to a detail based on one example shown in drawing. It is the flat-surface mold fluorescent lamp concerning this invention which is shown in drawing 1 with a

sign 1, and the luminescence side and the reflector are defined, the transparent electrode layer 3 by ITO etc. is formed by the phase confrontation by the side of one luminescence side glass substrate 2, this flat-surface mold fluorescent lamp 1 covers this transparent electrode layer 3, the transparence dielectric layer 4 is formed, and the luminescence side fluorescent substance layer 5 is formed further.
[0009] Moreover, the reflector layer 7 is formed by the phase confrontation of the reflection side glass substrate 6 of another side by aluminum vacuum evaporationo etc., if this reflector layer 7 is covered, the same transparence dielectric layer 3 as the thing of said luminescence side glass substrate 2 is formed, and the reflection side fluorescent substance layer 8 is further formed by the top face. In addition, it is the sealant with the frit glass for making discharge room 1a form with the luminescence side glass substrate 2 and the reflection side glass substrate 6 which is shown with a sign 9 all over drawing.
[0010] Here, since it is drawing 2 which shows the result of examination by the artificer for accomplishing this invention, said luminescence side fluorescent substance layer 5 emits light by being excited from a tooth-back side and the light from the reflection side fluorescent substance layer 8 is made to penetrate in addition, in this drawing 2 , the transparency brightness TB and permeability TT are measured about Thickness t. Moreover, since excitation is performed from a front-face side, measurement of the reflective brightness TR is performed, and as for said reflection side fluorescent substance layer 8, each result is displayed.
[0011] According to the above-mentioned measurement result, brightness tends to fall [the transparency brightness TB of said luminescence side fluorescent substance layer 5], so that Thickness t becomes thick, and thickness t1 falls [permeability TT] to coincidence, so that it becomes thick. therefore, it can presume that it becomes effective as a means of the improvement in brightness of the flat-surface mold fluorescent lamp 1 for it to be alike as much as possible in the luminescence side fluorescent substance layer 5, and to form thickness t1 thinly.
[0012] On the other hand, the reflective brightness TR of the reflection side fluorescent substance layer 8 is in the inclination which improves, so that thickness t2 becomes thick. However, even if brightness was saturated with 35-40 micrometers and thickness t2 increased thickness t2 more than it, the improvement in much more brightness became clear [not accepting]. Therefore, said reflection side fluorescent substance layer 8 can presume becoming effective as a means of the improvement in brightness of ****** which thickens thickness t2 in the above-mentioned range of thickness t2, i.e., the range to 40 micrometers.
[0013] Drawing 3 is what showed the brightness property of the flat-surface mold fluorescent lamp 1 made as an experiment based on the above-mentioned examination result. In the prototype, the thing (8 micrometers, 18 micrometers, 25 micrometers, and 35 micrometers) was prepared, respectively, combining these, the flat-surface mold fluorescent lamp 1 is created mutually, it was switched on to the thickness t1 of the luminescence side fluorescent substance layer 5, and the thickness t2 of the reflection side fluorescent substance layer 8, and the measurement of luminance was performed to them.
[0014] The curve F8 in drawing is a brightness property acquired when the luminescence side fluorescent substance layer 5 is fixed to 8 micrometers and the thickness of the reflection side fluorescent substance layer 8 is changed, like the following, 25-micrometer o'clock, 18-micrometer o'clock and a curve F25 show a 35-micrometer o'clock brightness property, and the luminescence side fluorescent substance layer 5 shows [the luminescence side fluorescent substance layer 5 / the luminescence side fluorescent substance layer 5] each a curve F35 for a curve F18.
[0015] In addition, if in charge of the comparison of the curve of each above, the reference value P has shown using as 100 the value of the brightness when forming the 18-micrometer thickness currently generally conventionally carried out as a certified value of the thickness of a fluorescent substance layer in this kind of fluorescent lamp in both luminescence side fluorescent substance layer 5 and reflection side fluorescent substance layer 8, and it is the brightness of this reference value P, i.e., this conventional kind, of flat-surface mold fluorescent lamp.
[0016] Also by this prototype, boil the luminescence side fluorescent substance layer 5 as much as possible, and it forms thinly. It is checked that it is effective in the improvement in brightness to form the reflection side fluorescent substance layer 8 thickly in the range to 40 micrometers. When the luminescence side fluorescent substance layer 5 was specifically formed as 8 micrometers and the reflection side fluorescent substance layer 8 was formed as 35 micrometers, it became clear that it is what can aim at improvement in brightness the abbreviation [1.3 times] of this (curvilinear F8 reference).

[0017] A means to obtain the desired thickness t1 and t2 in both the fluorescent substance layers 5 and 8 here is explained. According to the conventional dip method, the thickness obtained is limited to 15-18 micrometers, and cannot obtain desired thickness. So, in this invention, it changes to the above-mentioned dip method, screen printing is adopted as formation of both fluorescent substance layers 5 and 8, and adjustment of thickness is enabled.

[0018] At this time, first, it mixes with the solvent of the binder of an acrylic ester polymer system, aromatic series, or an ester system to the powder of a three-wave (R, G, B) fluorescent substance, considers as paste-like ink, and prepares for screen-stencil. After that, it prints on a glass substrate 2 and 6 by screen-stencil, and by performing desiccation and baking, it evaporates completely, a solvent and a binder are disassembled, and the fluorescent substance layers 5 and 8 are obtained.

[0019] Therefore, the fundamental thickness of the fluorescent substance layers 5 and 8 becomes what is determined by what thickness of the silk screen when screen-stenciling is made proper for, further, thickness can be finely tuned by adjusting suitably a mixing ratio with the powder of a three-wave fluorescent substance, the above mentioned binder, and the above mentioned solvent, and the fluorescent substance layers 5 and 8 of desired thickness are obtained by these means.

[0020]

[Effect of the Invention] It is that the fluorescent substance layer by the side of a luminescence side was set to 5-10 micrometers in thickness by this invention as explained above, and the fluorescent substance layer by the side of a reflector used thickness as the flat-surface mold fluorescent lamp set to 25-40 micrometers. As opposed to this kind with which the output of a direct light is performed only from one fluorescent substance layer side, one fluorescent substance layer is penetrated from one other fluorescent substance layer side, and the output of light is performed of flat-surface mold fluorescent lamp It becomes what gives the optimum conditions for raising luminous efficiency to each fluorescent substance layer, improvement in luminous efficiency is enabled by this, and the effectiveness which was extremely excellent in the improvement in the engine performance of this kind of flat-surface mold fluorescent lamp is done so.

[0021] Moreover, a fluorescent substance layer is conventionally formed with a dip method, it forms by screen-stencil by this invention to the ability not to acquire a desired value to the thickness of this fluorescent substance layer, and the outstanding effectiveness which makes operation easy also does so as that from which desired thickness is obtained free by adjusting the mixing ratio of the binder to the thickness at the time of printing, and fluorescent substance powder.

[Translation done.]